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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

AHMED, SHAMIM

ART UNIT

PAPER NUMBER

1765

DATE MAILED: 02/06/2003

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/960,316

Applicant(s)

SHIBATA, TSUYOSHI

Examiner

Shamim Ahmed

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 24 September 2001.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 2.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Drawings

1. Figures 1A-1F should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.
2. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference sign(s) mentioned in the description:

The reference character "4" is not found in the "Figure 2B", which is discussed in the specification page 15, lines 17-18.

The reference character "3a" is not found in the "Figure 2F", which is discussed in the specification page 17, lines 20-21.

The reference character "16" is not found in the "Figure 3E", which is discussed in the specification page 22, lines 15-16.

A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

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A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

4. Claims 1-6 and 20 are rejected under 35 U.S.C. 102(a) as being anticipated by Yasuda et al (JP-411283910).

As to claims 1 and 20, Yasuda et al discloses a process of making a semiconductor device with a superior resist pattern, wherein a first resist pattern (1a) is formed on a semiconductor substrate and then a covering layer (2) of silicon-containing polymer solution is coated on the first resist pattern (the abstract and paragraph 18-22 of the translated version of the JP-411283910).

Yasuda et al also disclose that the polymer solution contains solvent, which is not dissolving the first resist layer (see paragraph 64 of the translated version).

As to claims 2-4, the silicon-containing polymer includes organopolysiloxane (paragraph 36 of the translated version).

As to claim 5, the solvent is an organic solvent (paragraphs 34 and 47 of the translated version).

As to claim 6, Yasuda et al teach that the second resist layer or the covering layer is heated or prebaked to influence the next processing step (paragraph 64 of the translated version).

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 1-9 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yoko (JP-7-135140) in view of Novembre (USP 5,066,566).

As to claims 1-5 and 20, Yoko disclose a process of making resist pattern, wherein a resist pattern is formed over a semiconductor substrate and then a water-soluble polymer film such as silicon on glass (SOG) film is spin-coated on the resist pattern (see abstract).

Yoko does not explicitly teach that the coated SOG film contains a solvent during the coating process, which is incapable of dissolving the first resist.

However, it would have been obvious to have the polymer dissolved in a suitable solvent, which is conventional in a coating process such as spin coating process as supported by Novembre (USP 5,066,566).

Novembre teaches that typically a polymer is dissolved in a suitable solvent in a conventional coating process (see col.5, lines 36-60).

As to claim 6, Novembre teaches that the coated polymer is heated to remove residual solvent (col.5, lines 56-60).

Therefore, it would have been obvious to one skilled in the art at the time of claimed invention to combine Novembre's teaching into Yoko's process for evenly distributing the polymer material on the substrate surface in order to form a thick film over the substrate.

As to claim 7, Yoko teaches that a second resist film is formed prior to form the first resist film (see paragraph 13 of the translated portion).

As to claims 8-9, Yoko teaches that the coated SOG film is etched back until a portion of the first resist pattern is exposed (see paragraph 12-15 of the translated version).

Yoko also teaches that etching the first and second resist pattern as the residual covering layer being used as a mask layer (paragraph 16-19 of the translated version).

7. Claims 10-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yoko (JP-7-135140) in view of Novembre (USP 5,066,566) as applied to claims 1-4,7-9 and 20 above, and further in view of May et al (5,950,106).

Modified Yoko teaches above in the paragraph 6 but fails to teach that the surface of the coated SOG film is wet etched.

However, in a method of forming patterns containing silicon-containing polymers, May et al teach that etching of a SOG layer can be performed preferable by dry etching but alternatively, can be done by wet etching (col.4, lines 25-28 and col.5, lines 40-48).

Therefore, it would have been obvious to one skilled in the art at the time of claimed invention to combine May et al's teaching into modified Yoko's process because both the dry and wet etching are functionally equivalent for etching resist layer as taught by May et al.

As to claims 10 and 19, May et al teach that the wet etching is performed to etch or pattern the SOG using a diluted solution of nitric acid (col.5, lines 46-48).

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As to claim 11, Yoko teaches that the covering the SOG film and etching processes are continuously performed in a suitable coating and etching apparatus (see the abstract).

As to claims 12-14, Yoko teaches that the covering layer is silicon containing such as silicon on glass (SOG) (see the abstract).

As to claim 15, modified Yoko teaches that the covering layer composed of suitable solvent depending on the polymer material, wherein the solvent will not dissolve the under laying resist layer (see figure 3e).

As to claim 16, Novembre teaches that the spin-coated polymer is heated to remove residual solvent (col.5, lines 56-60).

As to claim 18, see the rejection to claims 8-9 above in the paragraph 6.

Conclusion

8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Toyoda (JP-406005629) disclose a method of making a semiconductor device, wherein planarizable resist layer (4) is formed over a first resist pattern; An IBM technical disclosure Bulletin discloses that a covering layer of resist material is polished until the first resist pattern is exposed and Motoyama (5,403,438) discloses a conventional process for making resist pattern.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Shamim Ahmed whose telephone number is (703) 305-1929. The examiner can normally be reached on M-Thu (7:00-5:30) Every Friday Off.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Benjamin Utech can be reached on (703) 308-3836. The fax phone numbers for the organization where this application or proceeding is assigned are (703)-872-9310 for regular communications and (703) 872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.



Shamim Ahmed
Patent Examiner
Art Unit 1765

SA
February 2, 2003